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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/844,626	04/27/2001	Elwin M. Beaty	60012US	2403

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EXAMINER

CHAWAN, SHEELA C

ART UNIT PAPER NUMBER

2625

DATE MAILED: 03/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/844,626

Applicant(s)

Elwin M. Beaty

Examiner

Sheela Chawan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-88 is/are pending in the application.
- 4a) Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-88 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on Apr 27, 2001 is/are a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some\* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\*See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 6 6) ☐ Other:

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## **DETAILED ACTION**

### ***Drawings***

1. Drawings filed on this 4/27/01 have been approved.

### ***Information Disclosure Statement***

2. Missing IDS information and Applicant needs to send a copy of IDS .

### ***Double Patenting***

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

4. A timely filed terminal disclaimer in compliance with 37 CFR 1.321© may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

5. Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

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6. Claims 1- 88, are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-30 of U.S. Patent No.( US. 6,064,756), Patent No. (US.6,064,757) and claims 1-30. Although the conflicting claims are not identical , they are not patentably distinct from each other because they represent the same invention .

7. Claims 1- 88, are rejected under the judicially created doctrine of double patenting over claims 1-30 of U. S. Patent No. (US.6,064756), since the claims, if allowed, would improperly extend the "right to exclude" already granted in the patent.

As to claim 1, teaches a three dimensional inspection method for inspecting ball array devices having a plurality of balls, wherein the ball array device is positioned in an optical system, the inspection method comprising the steps of Preamble Patent (US.6,064756) teaches see claim 1, column 18, lines 34- 37 ;

a) illuminating at least one ball on the ball array device, Patent (US.6,064,756) teaches see claim 1, column 18, lines 38- 39 ;

b) disposing a sensor, a first optical element and a second optical element in relation to the ball array device so that the sensor obtains at least two differing views of the at least one ball, the sensor providing an output representing the at least two differing views, Patent (US.6,064756) teaches see claim 1, column 18, lines 44-47; and

c processing the output using a triangulation method to calculate a three dimensional position of the at least one ball with reference to a pre-calculate calibration plane, Patent (US.6,064,756) teaches see claim 1, column 18, lines 44-47; and .

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As per claims 2-4, 25, 27,49 and 72 , the three dimensional inspection method of claim 1 wherein the pre-calculated calibration plane comprises a coordinate system having X, Y and Z axes and wherein a X measurement value is proportional to a Z measurement value, Patent (US.6,064,756) teaches see claim 3, column 18, lines 57-60 and .

As per claims 5, 26, 50 73,83 - 86, the three dimensional inspection method of claim 1 wherein the triangulation method is based on determining a center of the ball in a first view and determining a ball top location in a second view, Patent (US.6,064,756)teaches see claim 4,column 18, lines 61-64.

As to claims 6, 28, 51 and 74, the three dimensional inspection method of claim 1, wherein the pre-calculated calibration plane is defined by measuring a calibration pattern, Patent ( US. 6,064,756) teaches see claim 5,column 18, lines 65-67.

As per claims 7, 29,60 and 75, the three dimensional inspection method of claim 1, wherein the second optical element comprises a mirror, Patent (US.6,064,756)teaches see claim 6,column 19, lines 1-3.

As per claims 9 and 76, the three dimensional inspection method of claim 1, wherein one of the at least two differing views is obtained at low angle of view, Patent (US.6,064,756)teaches see claim 7,column 19, lines 4-5 .

As per claims 11, 34, 58, 63, 78 and 88 the three dimensional inspection method of claim 1 wherein the sensor comprises a charged coupled device array, Patent (US.6,064,756)teaches see claim 9,column 19, lines 9-11.

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As per claim 12, 35 and 59 the three dimensional inspection method of claim 1, wherein the sensor comprises a complementary metal oxide semiconductor device array ( note, any sensor devices would comprises of a detection system which are made up of many metal oxide semiconductor array . These detection devices such as sensors has a characteristics and can be considered as a common feature of any such devices, Patent (US.6,064,756) teaches see claim 1, column 19, lines 9-11.

As per claims 13, 38, 52 and 79 the three dimensional inspection method of claim 1 wherein the processing step further includes the step of applying grayscale edge detection to locate ball positions, Patent (US.6,064,756) teaches see claim 9, column 19, lines 12-15.

As per claims 14, 39, 53 and 87, the three dimensional inspection method of claim 1 wherein the processing step further includes the step of applying threshold analysis ( note, thresholding is a process of features extraction for identification of image components which are important to the image analysis being conducted . These may include boundaries, angles, area, center of mass, central moments, circularity , rectangularity and regional gray-scale intensities in the image being analyzed , Patent (US.6,064,756) teaches see claim 1, column 19, lines 12-15.

As per claims 15, 40 and 65 three dimensional inspection method of claim 1, optical ( note, optical system has lens , Preamble Patent (US.6,064,756) teaches see claim 1, column 18, lines 34- 37 .

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As per claims 16, 41 and 66 the three dimensional inspection method of claim 1 wherein the first optical element comprises a pin-hole lens, (note, optical system inherent has pin-hole lens Preamble Patent (US.6,064756) teaches see claim 1, column 18, lines 34- 37 .

As per claims 17, 42 and 67 the three dimensional inspection method of claim 1 wherein the first optical element comprises a plurality of lens elements, ( note, optical system has plurality of lens , Preamble Patent (US.6,064756) teaches see claim 1, column 18, lines 34- 37 .

As per claims 18, 43 and 68, the three dimensional inspection method of claim 1 wherein the first optical element comprises a telecentric lens, ( note, optical system inherent has telecentric of lens, Preamble Patent (US.6,064756) teaches see claim 1, column 18, lines 34- 37 ..

As per claims 19, 36,56 and 81 the three dimensional inspection method of claim 1 wherein the ball array devices comprise ball grid array devices , Patent (US.6,064,756)teaches see claim 12,column 19, lines 19-21.

As per claims 20, 37, 57 and 82 the three dimensional inspection method of claim 1, wherein the array devices comprise bump on wafer devices, Patent (US.6,064,756)teaches see claim 13, column 19, lines 22-24.

As per claims 21, 46 and 64 the three dimensional inspection method of claim 1 wherein the step of processing the output is carried out on a personal computer, ( note, optical system inherently has a processor and computer , Preamble Patent (US.6,064756) teaches see claim 1, column 18, lines 34- 37 . .

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As per claims 22 and 45 the three dimensional inspection method of claim 1 wherein the sensor includes a solid state sensor array, Patent (US.6,064,756) teaches see claim 9, column 19, lines 9-11.

As per claims 23, 62 and 71 the three dimensional inspection method of claim 1 wherein one of the views comprises a segment having a crescent shape, Patent (US.6,064,756) teaches see claim 18, lines 54-56 .

As per claims 24, 10 and 77 , a three dimensional inspection method for ball array devices having a plurality of balls, the method comprising the steps of: Preamble Patent (US.6,064,757) teaches see claim 1, column 18, lines 34-37.

a) illuminating the ball array device , Patent (US.6,064,757) teaches see claim 1, column 18, line 38 ;

b) disposing a sensor to receive light at a first angle relative to the ball array device , Patent (US.6,064,757) teaches see claim 1, column 18, lines 39 - 42, see claim 8, column 19, lines 5-7;

c) positioning a first optical element to transmit light to the sensor where the sensor obtains a first view of the ball array device, Patent (US.6,064,757) teaches see claim 1, column 18, lines 39 - 42, see claim 8, column 19, lines 5-7;

d) disposing a second optical element to receive light at a second angle different from the first angle and to transmit a second view of the ball array device to the sensor, Patent (US.6,064,757) teaches see claim 1, column 18, lines 39 - 42, see claim 8, column 19, lines 5-7;



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e) transmitting image information from the sensor ( note, camera 10 in fig 1A comprises an image sensor . The image sensor may be a charged coupled device array and camera 10 is connected to a frame grabber board 12 to receive the image 50 , Patent (US.6,064,757) teaches see claim 1, column 18, lines 39 - 42 ; and

f) processing the image information by applying triangulation calculation measurements of the image information so as to a three dimensional position of at least one ball with reference to a pre-calculated calibration plane , Patent (US.6,064,757) teaches see claim 1, column 18, lines 47 -50 and .

As per claims 31,33, 44, 55 and 80 the three dimensional inspection method of claim 24, wherein the step of illuminating comprises the step of illuminating with a ring light , Patent (US.6,064,757) teaches see claim 11, column 19, lines 15 - 17, note ring light is same as diffuse illumination and .

As per claim 47, the three dimensional inspection method of claim 24 wherein the second optical element reflects a view to the sensor where at least one ball of the ball array device exhibits a crescent shape, Patent (US.6,064,757) teaches see claim 2, column 18, lines 51- 53 .

As to claim 48, the same limitations as set forth in claim 24 are contained as an independent claim ( refer to claim 24, for common features ) except for step of claim 48, recites f) processing the image information by applying triangulation calculation measurements of the image information so as to a three dimensional position of at least one ball with reference to a pre-calculated calibration plane , wherein the calibration plane comprises a coordinate system

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having X,Y and Z axes, and wherein an X measurement value is proportional to a Z measurement value , Patent (US.6,064,757) teaches see claim 24, column 20, lines 30- 36 .

As per claim 69, the same limitations as set forth in claim 1, are contained as an independent claim ( refer to Patent (US.6,064,757) of claim 1, for common features ) except for step of claim 69, recites c) disposing a sensor to receive light at a first angle ( note, calibration reads on measuring the first and second angles which are two different angles relative to the calibration plane column 19, lines 5- 7) relative to the ball array device ... , Patent (US.6,064,757) teaches see claim 1, column 19, lines 5- 7) and .

e) disposing a second optical element to receive light at a second angle different from the first angle ..., ( note, calibration reads on measuring the first and second angles which are two different angles relative to the calibration plane column 19, lines 5- 7) relative to the ball array device ... , Patent (US.6,064,757) teaches see claim 1, column 19, lines 5- 7), and

f) transmitting image information representing the first view and the second view, ( note, camera device captures the image of the ball grid array view . The ball array device is positioned in a fixed optical system which is inherent in the patent to transmits the image information as stated in preamble of claim 1, of patent 6,064,757 , column 18, lines 35-36 ,

g) processing the image information by applying triangulation calculation measurements of the image information so as to a three dimensional position of at least one ball with reference to a pre-calculated calibration plane , wherein the calibration plane comprises a coordinate system

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having X,Y and Z axes, and wherein an X measurement value is proportional to a Z measurement value , Patent (US.6,064,757) teaches see claim 1, column 18, lines 54- 57 .

As to claim 70, is representative of claim 1, of Patent (US.6,064,757) teaches see claim 1, column 18, lines 33- 50 .

8. Claims 8, 30 and 61, are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over U.S. Patent No. (6,064,756) in view of Svetkoff et al., (US. 5,617,209).

Regarding claims 8, 30 and 61, Beaty et al., discloses apparatus for three dimensional inspection of electronic components. Beaty fails to teach the optical element comprises a prism. However, Svetkoff discloses method and system for triangulation -based , 3-D imaging utilizing an angled scanning beam of radiant energy. The system comprises of a three dimensional inspection method of claim 1, wherein the second optical element ( note, fig 8 consists of optical system , comprises a prism ( column 11, lines 21- 26 ) , as shown by Svetkoff the use of optical device such as prism , because the system provides a method which improves the reliability and accuracy of the measurement system by providing a consistent lead orientation, thereby alleviating data reduction requirements ( column 6, lines 19- 23).

Therefore, it would have been obvious to one with ordinary skill in the art at the time of invention to incorporate the teaching as taught by Svetkoff's into the system of Beaty, because, one with ordinary skill in the art would realize that it improves the reliability and accuracy of the measurement system by providing a consistent lead orientation, thereby alleviating data reduction

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requirements, as suggested by Svetkoff at ( column 6, lines 19- 23).

9. Claims 32 and 54, are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over U.S. Patent No. (6,064,756) in view of Roy et al., (US. 6,118,540).

Regarding claims 32 and 54 Beaty et al.,discloses apparatus for three dimensional inspection of electronic components. Beaty fails to teach the three dimensional inspection method of claim wherein the step of illuminating comprises the step of illuminating with a plurality of light emitting diodes. However, Roy discloses method and apparatus for inspecting a workpiece. The system comprises of the three dimensional inspection method wherein the step of illuminating comprises the step of illuminating with a plurality of light emitting diodes ( column 2, lines 52- 63) , as shown by Roy the use of plurality of light emitting diodes, because to provide appropriate coverage ( column 2, lines 52- 63).

Therefore, it would have been obvious to one with ordinary skill in the art at the time of invention to incorporate the teaching as taught by Roy's into the system of Beaty, because, one with ordinary skill in the art would realize that having more light emitting diodes can provide an appropriate coverage, as suggested by Roy at ( column 2, lines 52- 63).

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***Contact Information***

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sheela Chawan whose telephone number is (703) 305-4876.

If attempts to reach the examiner on Monday through Thursday from 8:30 a.m. to 5:00 p.m. by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta, can be reached at (703) 308-5246.

**Any response to this action should be mailed to:**

Commissioner of Patents and Trademarks

Washington, D.C. 20231

**or faxed to:**

(703) 872 - 9314, (for formal communications intended for entry)

**Or:** Any inquiry of a general nature or relating to the status of this application should be directed to the Group Receptionist whose telephone number is (703)305-4750.

SC  
Sheela Chawan  
Patent Examiner  
Group Art Unit 2625  
Feb 28, 2003

*Timothy M. Johnson*  
TIMOTHY M. JOHNSON  
PRIMARY EXAMINER